



[4910-13-P]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2018-0611; Product Identifier 2018-NE-21-AD; Amendment 39-19620; AD 2019-07-09]

RIN 2120-AA64

Airworthiness Directives; Rolls-Royce plc Turbofan Engines

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: We are adopting a new airworthiness directive (AD) for certain Rolls-Royce plc (RR) Trent 1000-A2, Trent 1000-AE2, Trent 1000-C2, Trent 1000-CE2, Trent 1000-D2, Trent 1000-E2, Trent 1000-G2, Trent 1000-H2, Trent 1000-J2, Trent 1000-K2, and Trent 1000-L2 model turbofan engines. This AD was prompted by reports of intermediate-pressure compressor (IPC) rotor seal failures. This AD requires initial and repetitive on-wing borescope inspections (BSIs) of affected IPC rotor seals and removing any cracked parts from service. We are issuing this AD to address the unsafe condition on these products.

DATES: This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

The Director of the Federal Register approved the incorporation by reference of certain publications listed in this AD as of [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: For service information identified in this final rule, contact Rolls-Royce plc, Corporate Communications, P.O. Box 31, Derby, England, DE24 8BJ; phone: 011-44-1332-242424; fax: 011-44-1332-249936; email: corporate.care@rolls-royce.com; Internet: <https://customers.rolls-royce.com/public/rollsroycecare>. You may view this

service information at the FAA, Engine & Propeller Standards Branch, 1200 District Avenue, Burlington, MA, 01803. For information on the availability of this material at the FAA, call 781-238-7759. It is also available on the Internet at <http://www.regulations.gov> by searching for and locating Docket No. FAA-2018-0611.

Examining the AD Docket

You may examine the AD docket on the Internet at <http://www.regulations.gov> by searching for and locating Docket No. FAA-2018-0611; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, the mandatory continuing airworthiness information (MCAI), the regulatory evaluation, any comments received, and other information. The address for Docket Operations (phone: 800-647-5527) is U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE., Washington, DC, 20590.

FOR FURTHER INFORMATION CONTACT: Besian Luga, Aerospace Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: 781-238-7750; fax: 781-238-7199; email: Besian.luga@faa.gov.

SUPPLEMENTARY INFORMATION:

Discussion

We issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to certain RR Trent 1000-A2, Trent 1000-C2, Trent 1000-D2, Trent 1000-E2, Trent 1000-G2, Trent 1000-H2, Trent 1000-J2, Trent 1000-K2, and Trent 1000-L2 turbofan model engines. The NPRM published in the Federal Register on August 9, 2018 (83 FR 39380). The NPRM was prompted by reports of IPC rotor seal failures. The NPRM proposed to require initial and repetitive on-wing BSIs of affected IPC rotor seals, and removing any cracked parts from service. We are issuing this AD to address the unsafe condition on these products.

The European Union Aviation Safety Agency (EASA), which is the Technical Agent for the Member States of the European Community, has issued EASA AD 2018-0095, dated April 24, 2018 (referred to after this as “the MCAI”), to address the unsafe condition on these products. The MCAI states:

During an engine shop visit, an affected seal was found with cracking at the seal head. Propagation of such cracking may lead to failure, causing secondary impact damage to the IPC module.

This condition, if not detected and corrected, could lead to engine power loss, possibly resulting in reduced control of the aeroplane.

To address this potential unsafe condition, RR published the NMSB, providing instructions for on-wing borescope inspections.

RR previously issued NMSB TRENT 1000 72-J353, which contains instructions for in-shop inspections.

For the reasons described above, this [EASA] AD requires repetitive borescope inspections of the front face of the affected seals and, depending on the findings, accomplishment of applicable corrections action(s).

You may obtain further information by examining the MCAI in the AD docket on the Internet at <http://www.regulations.gov> by searching for and locating Docket No. FAA-2018-0611.

Addition of Engine Models to Applicability

We have added the RR Trent 1000-AE2 and Trent 1000-CE2 model turbofan engines to the applicability of this AD. These engine models were not included in the NPRM because they had not been validated by the FAA when the NPRM published in the Federal Register on August 9, 2018 (83 FR 39380). These models were both validated by the FAA and added to Type Certificate Data E00076EN on December 20, 2018. Both

engine models were identified in EASA AD 2018-0095 and are subject to the same unsafe condition as the other models listed in the Applicability of this AD.

Neither the RR Trent 1000-AE2 nor the Trent 1000-CE2 turbofan engine is installed on any airplane of U.S. registry. Therefore, we did not revise our cost estimate in the Costs of Compliance section of this AD. Since our revision to the Applicability section of this AD does not add any additional burden to the public, we find good cause that notice and opportunity for additional public comment on this AD are unnecessary.

Addition of Replacement Cost Estimate

We added an estimated cost for replacement of the IPC rotor seal to this AD. Although this estimated cost was omitted from the NPRM, we are not adding any additional burden to the public since we have not changed the required actions of this AD. We are adding the cost of the IPC rotor seal simply to clarify the potential costs of this AD.

Comments

We gave the public the opportunity to participate in developing this final rule. We have considered the comment received. The Boeing Company supported the NPRM.

Conclusion

We reviewed the relevant data, considered the comment received, and determined that air safety and the public interest require adopting this final rule with the changes described previously and minor editorial changes. We have determined that these minor changes:

- Are consistent with the intent that was proposed in the NPRM for addressing the unsafe condition; and
- Do not add any additional burden upon the public than was already proposed in the NPRM.

Related Service Information under 1 CFR Part 51

We reviewed RR Non-Modification Service Bulletin (NMSB) Trent 1000 72-J353, Revision 2, dated February 14, 2018; RR Service Bulletin (SB) Trent 1000 72-J704, Initial Issue, dated June 23, 2017; and RR Alert NMSB Trent 1000 72-AJ929, Initial Issue, dated November 23, 2017. RR NMSB Trent 1000 72-J353 describes procedures for performing BSI of the front and rear face of the IPC rotor seal and defines acceptance and rejection criteria. RR SB Trent 1000 72-J704 introduces a revised IPC. RR Alert NMSB Trent 1000 72-AJ929 describes procedures for performing BSI of the front face of the IPC rotor seal and defines acceptance and rejection criteria. This service information is reasonably available because the interested parties have access to it through their normal course of business or by the means identified in the ADDRESSES section.

Costs of Compliance

We estimate that this AD affects 28 engines installed on airplanes of U.S. registry.

We estimate the following costs to comply with this AD:

Estimated costs

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
Inspect IPC rotor seal	7 work-hours X \$85 per hour = \$595	\$0	\$595	\$16,660

We estimate the following costs to do any necessary replacements that would be required based on the results of the proposed inspection. We have no way of determining the number of aircraft that might need these replacements:

On-condition costs

Action	Labor cost	Parts cost	Cost per product
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Action	Labor cost	Parts cost	Cost per product
Replace IPC rotor seal	8 work-hours X \$85 per hour = \$680	\$81,992	\$82,672

Authority for This Rulemaking

Title 49 of the United States Code specifies the FAA’s authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs, describes in more detail the scope of the Agency’s authority.

We are issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: “General requirements.” Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

This AD is issued in accordance with authority delegated by the Executive Director, Aircraft Certification Service, as authorized by FAA Order 8000.51C. In accordance with that order, issuance of ADs is normally a function of the Compliance and Airworthiness Division, but during this transition period, the Executive Director has delegated the authority to issue ADs applicable to engines, propellers, and associated appliances to the Manager, Engine and Propeller Standards Branch, Policy and Innovation Division.

Regulatory Findings

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the

national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify this AD:

- (1) Is not a “significant regulatory action” under Executive Order 12866,
- (2) Is not a “significant rule” under the DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979),
- (3) Will not affect intrastate aviation in Alaska, and
- (4) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

Adoption of the Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

PART 39 - AIRWORTHINESS DIRECTIVES

- 1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

- 2. The FAA amends § 39.13 by adding the following new airworthiness directive (AD):

2019-07-09 **Rolls-Royce plc:** Amendment 39-19620; Docket No. FAA-2018-0611; Product Identifier 2018-NE-21-AD.

(a) Effective Date

This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

(b) Affected ADs

None.

(c) Applicability

This AD applies to Rolls-Royce plc (RR) Trent 1000-A2, Trent 1000-AE2, Trent 1000-C2, Trent 1000-CE2, Trent 1000-D2, Trent 1000-E2, Trent 1000-G2, Trent 1000-H2, Trent 1000-J2, Trent 1000-K2, and Trent 1000-L2 model turbofan engines with intermediate-pressure compressor (IPC) rotor seal, part number (P/N) KH77674, installed.

(d) Subject

Joint Aircraft System Component (JASC) Code 7230, Turbine Engine Compressor Section.

(e) Unsafe Condition

This AD was prompted by reports of IPC rotor seal failures. We are issuing this AD to prevent an IPC rotor seal failure. The unsafe condition, if not addressed, could result in loss of engine thrust control and reduced control of the airplane.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

(g) Required Actions

(1) Perform an on-wing borescope inspection (BSI) of the IPC rotor seal using the Accomplishment Instructions, Paragraph 3, of RR Alert Non-Modification Service Bulletin (NMSB) Trent 1000 72-AJ929, Initial Issue, dated November 23, 2017, as follows:

(i) For engines with an IPC rotor seal with 300 cycles since new (CSN) or more as of the effective date of this AD, perform a BSI before the IPC rotor seal accumulates 400 flight cycles (FCs) after the effective date of this AD.

(ii) For engines with an IPC rotor seal with less than 300 CSN as of the effective date of this AD, perform a BSI before the IPC rotor seal accumulates 300 CSN or within 100 FCs after the effective date of this AD, whichever is later.

(iii) For engines that were modified to incorporate RR Service Bulletin (SB) Trent 1000 72-J704, Initial Issue, dated June 23, 2017, before the effective date of this AD, perform a BSI before the IPC rotor seal accumulates 400 FCs since the shop visit modification or before the next flight, whichever occurs later.

(2) Repeat the on-wing BSI at intervals in accordance with Figure 2 of RR Alert NMSB Trent 1000 72-AJ929, Initial Issue, dated November 23, 2017.

(3) An in-shop inspection in accordance with the Accomplishment Instructions, Paragraph 3, of RR NMSB Trent 1000 72-J353, Revision 2, dated February 14, 2018, may be substituted for an on-wing BSI as required by paragraphs (g)(1) and (2) of this AD, within the compliance times specified by paragraphs (g)(1) and (2) of this AD.

(4) If a crack is found on the front face of the seal that is at or beyond the rejection limits specified in Figures 1, 2, and 3 of RR Alert NMSB Trent 1000 72-AJ929, Initial Issue, dated November 23, 2017, replace the IPC rotor seal with a part eligible for installation before further flight.

(h) Operating Prohibition

After the effective date of this AD, do not operate an aircraft that has two engines installed that are both required by this AD to complete either the 50 FCs interval inspections or the single 100 FCs fly-on period as specified in Figures 1, 2, and 3 of RR Alert NMSB Trent 1000 72-AJ929, Initial Issue, dated November 23, 2017.

(i) Non-Required Action

None of the reporting requirements referenced in RR Alert NMSB Trent 1000 72-AJ929, Initial Issue, dated November 23, 2017; RR SB Trent 1000 72-J704, Initial Issue,

dated June 23, 2017; or RR NMSB Trent 1000 72-J353, Revision 2, dated February 14, 2018, are required by this AD.

(j) Alternative Methods of Compliance (AMOCs)

(1) The Manager, ECO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the ECO Branch, send it to the attention of the person identified in paragraph (k)(1) of this AD. You may email your request to: ANE-AD-AMOC@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

(k) Related Information

(1) For more information about this AD, contact Besian Luga, Aerospace Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: 781-238-7750; fax: 781-238-7199; email: Besian.luga@faa.gov.

(2) Refer to European Union Aviation Safety Agency (EASA) AD 2018-0095, dated April 24, 2018, for more information. You may examine the EASA AD in the AD docket on the Internet at <http://www.regulations.gov> by searching for and locating it in Docket No. FAA-2018-0611.

(l) Material Incorporated by Reference

(1) The Director of the Federal Register approved the incorporation by reference (IBR) of the service information listed in this paragraph under 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You must use this service information as applicable to do the actions required by this AD, unless the AD specifies otherwise.

(i) Rolls-Royce plc (RR) Non-Modification Service Bulletin (NMSB) Trent 1000 72-J353, Revision 2, dated February 14, 2018.

(ii) RR Service Bulletin Trent 1000 72-J704, Initial Issue, dated June 23, 2017.

(iii) RR Alert NMSB Trent 1000 72-AJ929, Initial Issue, dated November 23, 2017.

(3) For RR service information identified in this AD, contact Rolls-Royce plc, Corporate Communications, P.O. Box 31, Derby, England, DE24 8BJ; phone: 011-44-1332-242424; fax: 011-44-1332-249936; email: corporate.care@rolls-royce.com; Internet: <https://customers.rolls-royce.com/public/rollsroycecare>.

(4) You may view this service information at FAA, Engine & Propeller Standards Branch, 1200 District Avenue, Burlington, MA, 01803. For information on the availability of this material at the FAA, call 781-238-7759.

(5) You may view this service information that is incorporated by reference at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: <http://www.archives.gov/federal-register/cfr/ibr-locations.html>.

Issued in Burlington, Massachusetts, on April 15, 2019.

Karen M. Grant,
Acting Manager, Engine and Propeller Standards Branch,
Aircraft Certification Service.
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